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Spring 2020

PHYS 111-102: Physics I

Cristiano Dias

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Prof: Cristiano L. Dias**Office:** Tiernan Hall, room 462**e-mail:** cld@njit.edu**Office hours:** Tuesday from 5 to 6 pm**PREREQUISITE:** Math 131 (if not originally placed in Math 111).**COREQUISITE:** Math 111 or Math 132, Phys 111A.

FAILURE TO MEET EITHER CO-Requisites or PRE-Requisites will result in student being dropped from class.

COURSE MATERIAL:

Access to electronic version of the textbook **University Physics with Modern Physics (by Young & Freedman), 13th edition** by Pearson and to online homework can be obtained through: **masteringphysics.com**. You can either go directly to masteringphysics.com (which is probably the least expensive option – see below) with your credit card (or PayPal), or first get the Standalone Access Card -- for University Physics with Modern Physics (by Young & Freedman), 13th edition, ISBN 9780321741257. (Since the hard copy of the 13th edition is currently out-of-print, the 2nd option –with the Standalone Access Card- can provide somewhat less flexibility). When registering, you must login with a proper course identifier which will automatically bring you to the proper edition and to our course (other web addresses, even from the same publisher, can bring you to a wrong edition). If you would also like a hardcopy version of the textbook, you can get any recent edition of the Young & Freedman's text, new or used ('used' can be the only option for the 13th edition). We use Chapters 1 to 13 which sometimes you can get separately from the rest.

Homework assignments will be posted on-line. Students login, download and solve the assigned problems, and submit answers to the automated grading system. Specific Information for the **Mastering Physics** homework system: Your instructor will announce a Mastering Physics course identifier for you to use when enrolling in your specific class: **MPDIAS2064727**. Here is one of the ways to register: Go to [masteringphysics.com](https://www.masteringphysics.com), then to 'Students, get registered', then to 'OK! Register now.' On the next page when asked for course ID enter **MPDIAS2064727** provided by your instructor. On the next page select 'create an account'. This will bring you to the page where you enter your data and check only the 1st box with 'I agree ...'. After that, you finalize creation of the account by entering the required payment information.

For your own reference, record the unique course identifier announced by your instructor, and your login ID and password. Instructors cannot access forgotten logins or passwords.

NOTE: THE LABORATORY COURSE, PHYS 111A, MUST BE TAKEN CONCURRENTLY WITH PHYS 111. THE STUDENT MUST REGISTER FOR BOTH THE LEC/REC AND THE LAB COURSE. WITHDRAWAL FROM EITHER COURSE WILL CAUSE A SIMULTANEOUS WITHDRAWAL FROM BOTH COURSES. Otherwise, the Lab course is run separately from the lec/rec course – see <https://centers.njit.edu/introphysics/welcome/>.

ATTENDANCE: It is expected that students will attend all lectures and recitations. Attendance will be taken at all classes and exams. More than 3 unexcused absences (in total) are excessive. If you have excusable absences contact the Dean of First Year Students. If you must withdraw from the course, do it officially through the Registrar. Do not simply stop attending and taking exams: that forces the instructor to assign a course grade of "F".

HELP: Visit or email your instructors if you are having trouble with the course; do not simply hope for a miracle and fall further behind. The Physics Dept. office on the 4th floor of Tiernan has specific information on tutoring. Physics tutoring is available through the CAPE organization, and possibly elsewhere.

GRADING: Your final letter grade in Phys 111 will be based on a composite score for term's work that includes the common exam scores, the final exam, lecture/recitation quizzes, and the homework score.

1) Common Exams Three common exams will be given during the semester. The exam schedule is:

- **Common Exam 1:** Monday, Feb. 24 4:15 -- 5:45 PM
- **Common Exam 2:** Monday, March 30 4:15 – 5:45 PM
- **Common Exam 3:** Monday Apr. 13 4:15 – 5:45 PM

In-class quizzes covering the preceding or current work may be given during lectures and/or recitations. Those scores count toward your final course grade. Some professors will be using I-clickers as in-class quizzes. **There are no make-ups for in class activities.** Students missing a quiz will receive a grade of zero for that item. The general policy is that students who miss a common exam will receive a score of zero for that Exam. That score will be included in the calculation of your final grade. Students that miss two common exams automatically fail the course. Students who anticipate an absence from a common exam should discuss their situation with their instructor PRIOR TO their absence. In order to be qualified to receive a "make-up" common exam score (a very rare occurrence), the student should present documentation for not being able to take the test as scheduled. As is the standard policy of NJIT, this documentation should be presented to the student's to the **Dean of Students - (973) 596-3466, Room 255 Campus Center**. BOTH the Physics 111 instructor and Dean of Students must concur in permitting a "make-up" common exam. Students who miss

common exams that do not present documentation within 7 days of the common exam will receive a score of zero for the common exam.

In the event that the above qualification is met, a separate make-up test for the missed common quiz will not be offered. Instead, the portion of the final exam relevant to the contents of the missed test will be considered for giving a grade for the missed test. The instructor will evaluate the final exam questions from those chapters and normalize this portion of the student's grade for the missed common quiz.

2) **Lecture Quizzes** A short quiz will be given during each lecture/recitation period.

3) **Homework** Homework assignments will be posted on-line using the Mastering Physics Homework System, as described on the previous page.

4) **Final Exam** **Comprehensive Final Exam will be given** during Final Exam Period (May 8 - 14).

Final Letter Grades: Here are the approximate weights to be used for calculating the composite score:

- **48%** for all three common exams (16% each)
- **32%** for the final exam
- **10%** for the total of homework work
- **10%** for the all in-class quizzes

The cutoff percentages for various letter grades will be:

Percentage	Letter Grade
> 85%	A
85 – 80	B+
80 – 70	B
70 - 65	C+
65 - 55	C
55 - 50	D
< 50	F

Final grades are not negotiable: A score of 84.99% is a B+, not an A.

Statement on academic integrity:

“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu”

Turn off all cellular phones, wireless devices, computers, and messaging devices of all kinds during classes and exams. Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors. Creating noise or otherwise interfering with the work of the class will not be tolerated.

LEARNING OUTCOMES: For this course, which is the first of the introductory Physics series, you can expect to be assessed on the following learning outcomes:

1. Manipulate vectors in components form and as magnitude/direction. Perform vector operations such as addition, subtraction, scalar, and cross products.
2. Recall the definitions and relationships involving position, velocity, speed, acceleration.
3. Apply the equations governing 1-D constant acceleration to mechanical systems for various initial conditions.
4. Apply the equations governing 2-D constant acceleration to mechanical systems for various initial conditions.
5. Comprehend the meaning of the equations governing net force and acceleration (Newton's Laws) for linear motion, and be able to manipulate them in conjunction with a free-body diagram to obtain any desired quantitative relationship.
6. Understand the extension of free-body diagrams and Newton's laws to rotational motion.
7. Understand the extension of free-body diagrams and Newton's laws to frictional forces.
8. Comprehend the definitions and application of work, energy, and conservation of energy principles to solving mechanical and non-conservative systems.

9. Comprehend the meaning of equations governing momentum, impulse, and collisions. Apply the equations governing momentum, impulse, and collisions mechanical systems for various initial conditions. Understand under what conditions momentum is conserved and how to use this relation to calculate unknown quantities based on physical relationships, initial conditions, and known quantities.
10. Define and calculate the center of mass of a system as well as the moment of inertia.
11. Extend the concepts and equations of 1-D constant acceleration to rotational motion for various initial conditions.
12. Understand the extension of linear motion equations to rotational motion. Comprehend the meaning of the equations governing rotational motion and acceleration, and be able to manipulate them in conjunction with a free-body diagram to obtain any desired quantitative relationship.
13. Understand the extension of work, energy, and conservation of energy principles to rotational motion.
14. Recall the definitions of angular momentum. Apply this concept to conservation of angular momentum.
15. Apply concepts of Newton's Laws to equilibrium of linear and rotational motion.
16. Understand the extension of conservation of energy and mass equations to fluid dynamics.
17. Understand the extension of Newton's Laws and energy concepts to gravitation.

Syllabus

TOPIC	TEXT STUDIES	Notes
Week 1 Units, Physical Quantities, and Vectors + Forces as vectors	Chapt. 1	
Week 2 Motion in One Dimension	Chapt. 2	
Week 3 Motion in Two Dimensions	Chapt. 3	Optional: Sect. 3.5
Week 4 Newton's Laws of Motion	Chapt. 4	
Week 5 Applying Newton's Laws	Chapt. 5	Optional: Sect. 5.5
Common exam 1 – 2/24		Units, Vectors + kinematics in 1D and 2D+forces as vectors
Week 6 Work, Kinetic Energy	Chapt. 6	Refresh: scalar (dot) product
Week 7 Potential Energy, Conservation of Energy	Chapt. 7	Optional: Sect. 7.5
Week 8 Linear Momentum and Collision	Chapt. 8	Optional: Sect. 8.6
Spring Break 3/15-3/22	No classes	
Common exam 2 –		Newton's laws, work, energy
Week 9 Rotation, Moment of Inertia	Chapt. 9	
Week 10 Dynamics of Rotational Motion	Chapt. 10 – Sections 1-6	Refresh: vector (cross) product
4/10 – 'Good Friday'	No classes	
Common exam 3 – 4/13		Energy, momentum and collisions, impulse, center-of-mass, rotational kinematics, rotational energy
Week 11 Static Equilibrium	Chapt. 11 – Sections 1-3	

Week 12 Fluid Mechanics	Chap.12 – Sections 1-5	
Week 13 Universal Gravitation	Chap. 13	Optional: Sect. 13.6, 13.7
Week 14 (Friday Schedule for May 5)	REVIEW	
Final exam		Torque, ang. momentum, statics, fluids, gravitation + all previous topics

Spring 2020 Academic Calendar

January	20 Monday	Martin Luther King, Jr. Day
January	21 Tuesday	First Day of Classes
January	25 Saturday	Saturday Classes Begin
January	31 Friday	Last Day to Add/Drop a Class
January	31 Friday	Last Day for 100% Refund, Full or Partial Withdrawal
February	1 Saturday	W Grades Posted for Course Withdrawals
February	3 Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February	17 Monday	Last Day for 50% Refund, Full Withdrawal
March	9 Monday	Last Day for 25% Refund, Full Withdrawal
March	15 Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March	22 Sunday	Spring Recess Ends
April	6 Monday	Last Day to Withdraw
April	10 Friday	Good Friday - No Classes Scheduled - University Closed
May	5 Tuesday	Friday Classes Meet
May	5 Tuesday	Last Day of Classes
May	6 Wednesday	Reading Day 1
May	7 Thursday	Reading Day 2
May	8 Friday	Final Exams Begin
May	14 Thursday	Final Exams End
May	16 Saturday	Final Grades Due